

MERCHANT CALCULATORS

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Operating Instructions

MARCHANT
CALCULATORS

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EXEMPLIFYING UNPRECEDENTED

"Silent Speed Supremacy"

IN MECHANICAL CALCULATIONS

THE CONTRIBUTION OF
MARCHANT CALCULATING MACHINE COMPANY
OAKLAND 8, CALIFORNIA, U.S.A.

Foreword

"In character, in manners, in style, and in all things, the supreme excellence is simplicity."

—LONGFELLOW

Simplicity of operation is fundamental in the new *Silent Speed* Marchant. No prior experience or long training period is required.

The simple operating instructions outlined herein will enable the inexperienced operator to master all the essentials of operation and application involving Addition, Subtraction, Multiplication and Division, and their various combinations, with a few minutes of practice.

So that your *Silent Speed* Marchant may serve you to the fullest extent we urge you to become familiar with its many operating advantages and their application to your figure work.

It will handle your figuring problems as efficiently, accurately and speedily as it is now solving those of every type of business all over the world.

For detailed instructions on how to solve problems particularly adapted to your business, or for any special assistance desired in the handling of your figure routine, call your local Marchant representative, or write direct to

MARCHANT CALCULATING MACHINE COMPANY

HOME OFFICE: OAKLAND 8, CALIFORNIA, U. S. A.

*Sales Agencies and Manufacturer's Service Stations
Give Service Everywhere*



LEADERSHIP

Your *Silent Speed* Marchant Calculator is the world's fastest calculator. It operates with unchallenged ease and simplicity, and with a control of accuracy of the entered factors and of the answer calculated from them that is not equalled in the calculator art.

For thirty-seven years Marchant has successfully pioneered for greater efficiency in handling figure work. The genius and manufacturing excellence of Marchant engineers first introduced to mechanical calculating many features which are today accepted as standard. Many additional features, exclusive with Marchant, have been added. They combine to offer in Marchant *Silent Speed* Calculators today's highest possible calculator performance.

Marchant's long experience in the calculator field assures every user the finest of material and workmanship.

Every known inspection test for quality is expertly applied. To this patient precision in manufacturing, Marchant owes its unfailing accuracy and permanent durability.

GUARANTEE

Every purchaser of a Marchant is guaranteed free service for twelve months; but the Marchant is designed to give continuous performance throughout many years. After the first year purchasers may, if desired, and for a modest annual payment, enjoy continued service guaranteeing protection against all normal operating contingencies.

SERVICE

Marchant sales and service is world-wide. Mechanical service by factory trained technicians is available at Marchant offices in all principal cities of the United States, assuring long economical life and satisfactory performance under all conditions.



Model ACR-8M is similar but has Tabulation Keys on carriage.

MODEL ACT-10M

With Selective Carriage Tabulation

SILENT SPEED CALCULATOR FOR FULLY AUTOMATIC MULTIPLICATION AND DIVISION

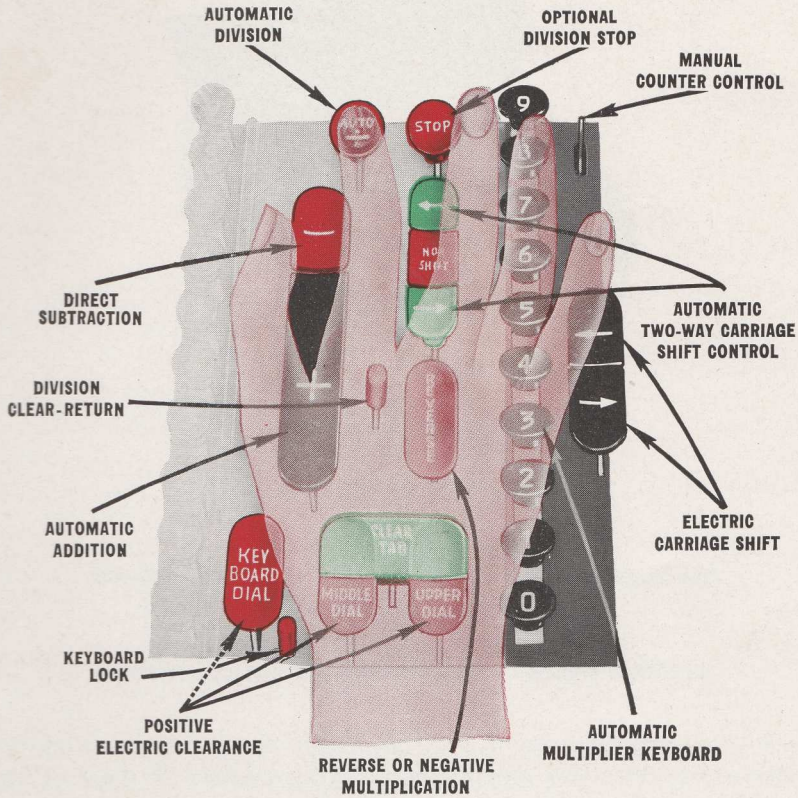
This model represents the highest development in the calculating machine art and establishes a new standard of efficiency and performance in the handling of all figure work. It automatically performs all calculations quietly, with marvelous ease and unprecedented speed.

In addition to the many other features which are exclusive and standard on all Marchant calculators, it has Instant Automatic Selective Tabulation, Automatic Two-way Carriage Shift, and Fully Automatic Multiplication, either positively or negatively, with or without accumulation. The Multiplier Keyboard accepts the entry of the multiplier as fast as it is read from the worksheet. The calculator multiplies simultaneously with multiplier entry, completing the answer almost instantly after entry of the last figure of the multiplier.

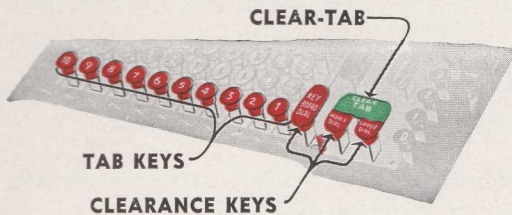
These new *Silent Speed* Marchants are extremely attractive, streamlined, compact, light and portable, with a permanent durability that assures long and satisfactory service.

NO STOP AND START! NO SHOCK! CONTINUOUSLY FLOWING MECHANISM

ACR-8M or ACT-10M ONE-HAND KEYBOARD CONTROL

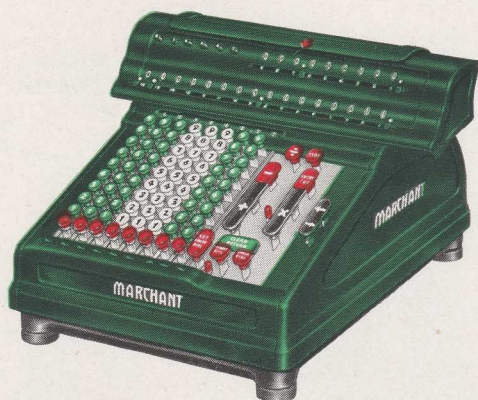


Automatically operated by control keys under the finger-tips of either hand, Marchant gives instant results with new simplicity and unquestioned ease of operation . . . with complete elimination of nerve strain and fatigue.



Model ACT-10M has Selective Carriage Tabulation controlled by keys illustrated at left.

Model ACR-8M has tabulation controlled by Tab Keys located on carriage. See Page 13.



MODEL ACR-8D

Also manufactured in 10-column capacity as Model ACR-10D

SILENT SPEED CALCULATOR FOR ELECTRIC MULTIPLICATION AND AUTOMATIC DIVISION

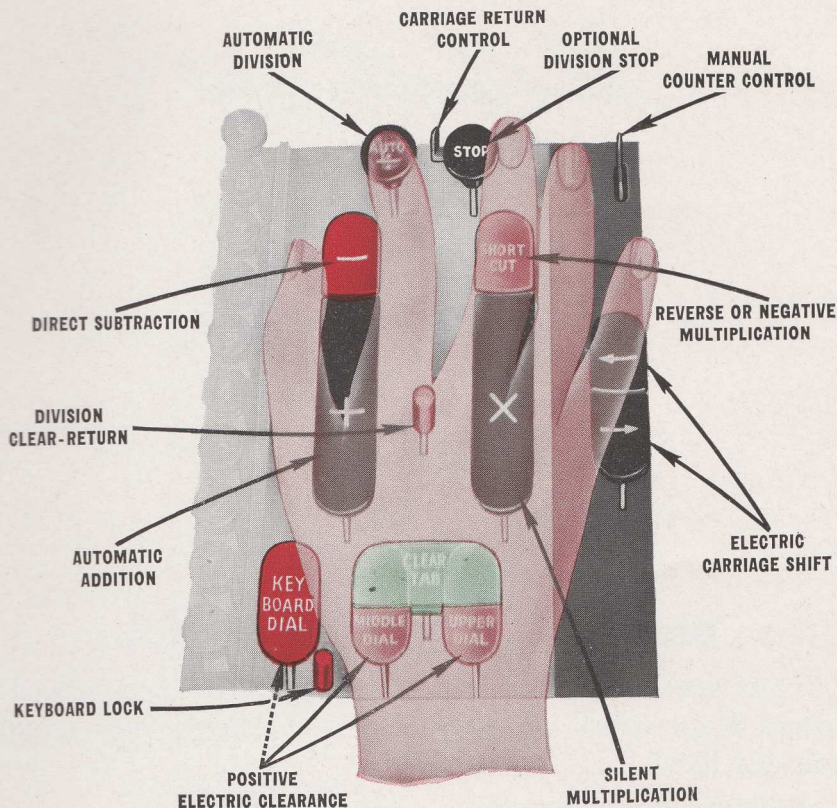
With all operations keyboard controlled under the finger-tips of one hand, this outstanding calculator quietly and quickly performs all types of figure work with the greatest of ease.

Its superiority is emphasized by the continuously flowing dials of its Silent Speed smoothly geared mechanism. Exceptional features comprise Automatic Add and Subtract Bars separated from the multiplying bars, Selective Automatic Carriage Tabulation with step-by-step shuttle action, Automatic Division with automatic clear-return of carriage, True figure Dials for All Three Factors, and Complete Capacity Carry-over.

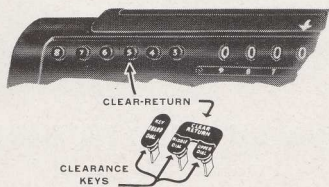
Electric short-cut multiplication may be from left or right as best suits the convenience of the operator or the problem at hand.

These models are compact, light and portable, and their attractive streamlined appearance magnificently portrays Marchant excellence.

ACR-8D or ACR-10D ONE-HAND KEYBOARD CONTROL



The *Silent Speed* Marchant presents a compact keyboard control hitherto unknown, permitting complete operating control under the finger-tips of either hand. Marchant's simplicity of control sets new and unequalled standards of calculator performance, giving maximum results with a minimum of operating effort.

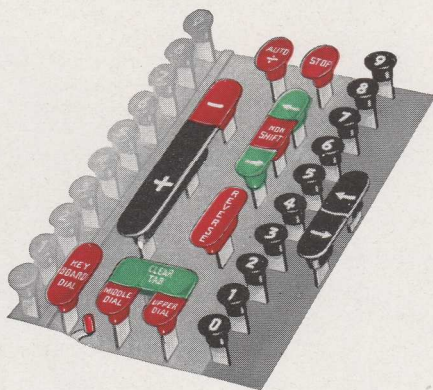


Selective Carriage Tabulation is controlled by Tab Keys and Clear-Return Key, as illustrated at left.

Operating Instructions

FOR

"Silent Speed Supremacy"



ONE-HAND KEYBOARD CONTROL

Every operation of the *Silent Speed Marchant* is governed by Control Keys, which are compactly and conveniently grouped under one hand.

No laborious reaching for cranks or levers.

No hand travel necessary. Merely depress the key marked for the kind of work you wish performed.

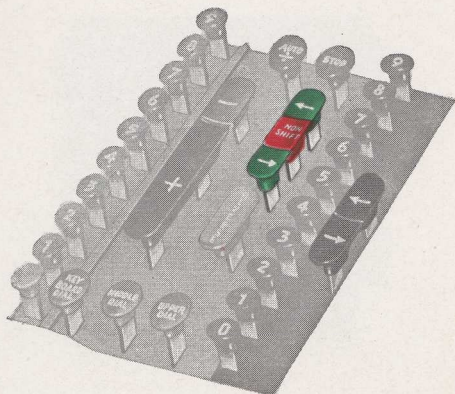
This makes every calculation, be it simple or intricate, easy and obvious, even to the novice.

All operations are performed electrically for the greatest ease of the operator. Interlocking safety devices automatically prevent the depression of any key that would interfere with any operation in progress.

This is indeed "Keyboard Controlled" under the finger-tips of one hand, left as easy as right!

AUTOMATIC TWO-WAY CARRIAGE SHIFT

on ACR-8M and ACT-10M Models



To direct Carriage Shift in Automatic Multiplication, merely depress the green key with arrow pointing the direction you wish the carriage to travel. To reverse carriage travel, depress the other green key. To hold the carriage stationary, depress red Non-Shift Key. Depression of one key automatically releases the other.

In going from Multiplication to Division, or vice versa, the carriage operation is entirely automatic. No preparation necessary!

During Division, the carriage automatically shifts in the proper direction, regardless of green key indication or type of previous operation.

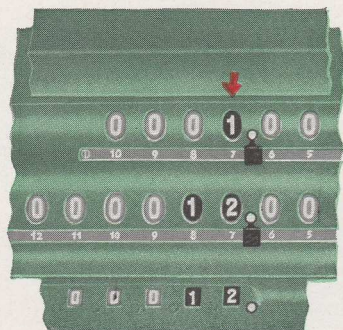
To move the carriage without other operations, depress either of the black Electric Carriage Shift Keys on the right and the carriage will smoothly glide in the direction the arrow indicates.

Carriage may be shifted on Model ACT-10M to any position by depressing the red tab key marked for the position to which the carriage is to be shifted. This shift to the position of any pre-set tab key also may be made automatically with or without simultaneous clearance of any or all dials by depression of green Clear-Tab Key. This latter method of shift is likewise used on Model ACR-8M.

DIRECTIONAL SHIFT ON MODELS ACR-8D AND ACR-10D

The small lever at top of control panel if positioned to the right causes carriage to shift to the right upon depression of Clear-Return Key, stopping at tab-key position. If positioned to the left, the carriage shifts to the extreme left.

RED CARRIAGE-POSITION INDICATOR



MARCHANT has completely eliminated all effort and loss of time by the operator in determining which one of the Upper Dials will be acted upon by the next multiplier figure that is entered.

Regardless of carriage position, at all times a conspicuous red arrow points directly to the Upper Dial that becomes active. This automatically indicates operating position and assures immediate selection of the proper dial.

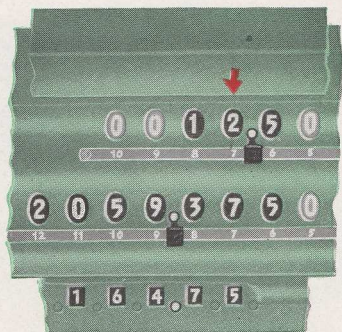
There is no searching for operating position . . . no nerve strain guessing which dial will operate.

COMPLETE CAPACITY CARRY-OVER

This feature is indispensable to any calculator user. All carriage dials are active regardless of carriage position. There are no dead spots, no figures dropped. Automatic accuracy is provided to the full limit of dial-capacity for any problem by any method.

Complete Capacity Carry-Over protects the operator from fear of errors and need of using special manipulations as required on calculators without full carry-over.

TRUE FIGURE DIALS FOR ALL THREE FACTORS



Dials for all factors, including keyboard set-up, are closely grouped in perfect three-dial alignment. *Each and every operation performed on the calculator is recorded in one or more of these three dials.*

UPPER DIAL

In this dial is recorded the Multiplier in Multiplication, the Quotient in Division, and the Count of Items in Addition or Subtraction.

MIDDLE DIAL

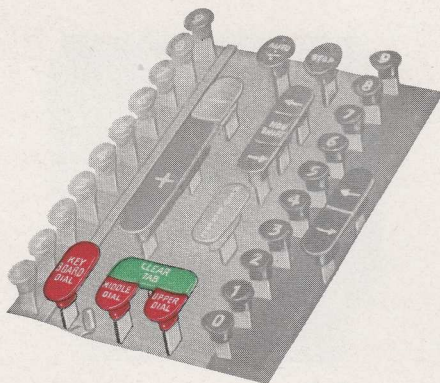
In this dial is recorded the Product in Multiplication, the Dividend and Remainder in Division, the Sum in Addition, and the Remainder in Subtraction.

KEYBOARD DIAL

By means of this outstanding feature, *every figure set on the keyboard instantly appears in a straight line in the Keyboard Dial*, entirely eliminating "zig-zag" reading of depressed keys.

All three factors, including keyboard set-up, appear in full review upon completion of every multiplication. This permits not only instant checking of the operator's entry of the figures, enabling immediate correction to be made either during or after entry, but it also gives proof of posting and transcribing if *all* factors are copied *from the dials* to the final work and the latter then visually compared with original figures from which calculation was made. *This is Double Entry calculating and provides unmatched accuracy control.* (See Page 40.)

POSITIVE ELECTRIC CLEARANCE



Certainly the most frequent and usually the most difficult task with the ordinary calculator is complete clearance of the entire machine.

Dial clearance being constantly necessary, either before or after each calculation, it should be instant, easy and positive.

Marchant has perfected *the most convenient Positive Electric Clearance*—operating from the keyboard by the feather touch of a key, *regardless of carriage position*.

These positive electric Clearance Keys are conveniently grouped to permit instant and complete clearance of the keyboard and all dials simultaneously—a *single one-hand operation*—or any one or more dials selected may be cleared at will in accordance with the key-top marking.

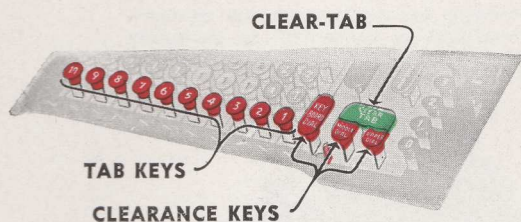
Release of any keyboard key may be obtained by touching the key at bottom of the column, except that on the ACT-10M model, the key is released by momentarily depressing any two keys in the column.

FLEXIBLE SINGLE-KEY DEPRESSION

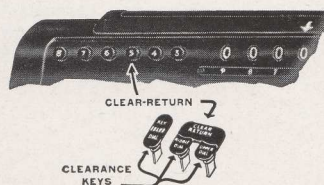
The *Silent Speed* Marchant is equipped with a *positive flexible keyboard*, which *prevents setting more than one key in the same column at the same time*.

To change any digit set in the Keyboard Dial, depress the key with the desired digit in the column in which the change is to be made. This will automatically release any other key in that column and at the same time change the reading of the Keyboard Dial.

SELECTIVE CARRIAGE TABULATION



On Model ACT-10M



*On Models ACR-8M,
ACR-8D and ACR-10D*

A single touch of the Clear-Tab Key (designated Clear-Return on some models) automatically tabulates carriage to next starting position, either with or without simultaneous clearance of any or all dials.

On Model ACT-10M, the position to which carriage will tabulate is determined by depression of any one of the row of red tab keys arranged horizontally at the bottom of the keyboard and numbered to correspond to carriage positions marked on the Upper Dial. A full depression of the red tab key causes carriage to tabulate instantly; a partial depression (until it clicks), causes carriage to tabulate only when Clear-Tab Key is touched.

On other models the tab keys are located at left of carriage as illustrated above at right. Shift to position of a depressed tab key occurs when directional shift key is set for carriage travel to the right during return. Shift to full limit of travel occurs if directional shift key is set for carriage travel to the left during return. On these models any desired number of tab keys may be set by depressing them simultaneously. In this case, the carriage shifts by step-by-step shuttle action from one position to the next upon successive depressions of Clear-Return Key. The highest numbered tab key on these models acts as a clearance key for the other tab keys; the carriage will shift to the position indicated by such end-key without need of its being depressed.

MANUAL COUNTER CONTROL

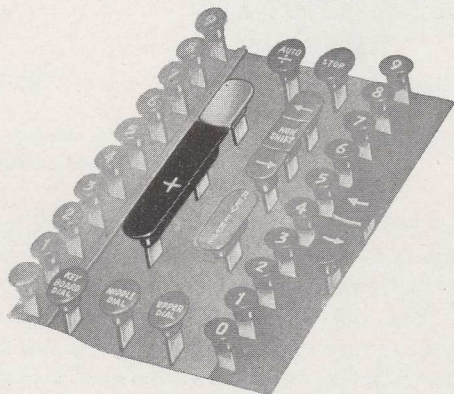
The Manual Counter Control is located at the extreme upper right corner of the keyboard, and is in normal position when inclined away from the operator.

With this control in that normal position, the Upper Dial automatically shows the Multiplier or the Quotient in "true" figures.

When the control is moved toward the operator the Upper Dial will show the complement of the Multiplier or Quotient, as the case may be. In Reverse Multiplication with this setting the negative Multiplier is shown in "true" figures.

Automatic Addition

(Throughout these operating instructions, model designations are sometimes simplified by using "D" to designate models ACR-8D and ACR-10D, and "M" to designate models ACR-8M and ACT-10M.)



Set each item in Keyboard Dial and lightly touch the Add Bar. It is not necessary to pre-condition the calculator to make it suitable for addition even though it may have previously been multiplying or dividing. *Marchant's Automatic Addition is always ready!* The correct total is always visible in the Middle Dial, and the number of items is counted in the Upper Dial, regardless of how slow the operator may be in releasing the Add Bar, for an exclusive Marchant feature automatically limits the number of cycles to one when the Add Bar is used.

Each item as set up appears in Keyboard Dial, giving a *visible check* and permitting any change before the item affects the total. As each number is added, the Keyboard Dial automatically clears ready for the next entry.

Example of Marchant Normal Automatic Addition:

	With carriage to the extreme left, Red Carriage-Position Indicator above Upper Dial "1," set 225 at the right of the keyboard. It is instantly visible in a straight line in the Keyboard Dial. A touch of the Add Bar then adds this figure into the Middle Dial and automatically clears it from the Keyboard Dial. Now place
225	665 in Keyboard Dial; again touch the Add Bar. Repeat the process until all five amounts have been added.
665	
715	
823	
747	
—	
3175	The total of 3175 appears in the Middle Dial, and the number of items, 5, in the Upper Dial.

AUTOMATIC REPEAT ADDITION

Automatic Repeat Addition is accomplished by depressing the Add Bar simultaneously with the key of the Multiplier Keyboard that indicates the number of times the item is to be repeated.

Marchant automatically counts, repeats the additions, and clears the Keyboard Dial.

Example:

3503	Place 3503 in Keyboard Dial; touch Add Bar. Place
6890	6890 in Keyboard Dial; touch Add Bar. Place 2356 in
{ 2356 }	Keyboard Dial and simultaneously depress the Add
{ 2356 }	Bar and the "4" key of the Multiplier Keyboard. 2356
{ 2356 }	will be automatically added four times and cleared
1653	from the Keyboard Dial, leaving the calculator ready
1022	for the next operation.

22492 *On Model D, use the Multiplier Bar for repeated additions, checking with Upper Dial Item Counter.*

AUTOMATIC LOCKED-FIGURE ADDITION

This method permits the number that is being added to remain in the Keyboard Dial after it has been added, which is desirable in some types of work, such as, for example, when the amount so added is to be multiplied by a factor or used as a divisor after the addition.

In this case the "1" key of the Multiplier Keyboard is depressed (or X Bar of Model D is touched) instead of touching the Add Bar. The Non-Shift Key of Model M should normally be down when this method is used.

The locked figure method of addition is not recommended, except in the special cases where it is needed, because every cipher of the number being set up in the Keyboard Dial must be produced by separately clearing a digit from the previous set-up. If the Marchant normal method is used, such ciphers are automatically produced by clearance of the previous number when the Add Bar is depressed, hence it is only necessary to set up the digits 1 to 9 inclusive. This saves 10 per cent of the key depressions. The locked figure method is also not recommended on *any* bar type model (such as our D), except in the case of the special problems that demand its use, because it requires that extra care be taken to touch X Bar so only one revolution will take place. If the bar is depressed too long, more than one addition of the number will be made.

USEFUL HINTS FOR ADDITION

ADDING A CONSTANT

If totals are being accumulated at several sections of the Middle Dial, such as in dual addition (see below), an amount may be added to more than one of the totals by shifting the carriage so the total appears directly above the amount in Keyboard Dial that is to be added. If the "locked figure method" is used, the Constant may be added to each total by shifting the carriage so it comes beneath each group in succession. It may be added to the last group by a depression of the Add Bar, which simultaneously clears the Keyboard Dial.

ADDING TO A CONSTANT

With Non-Shift Key depressed, add the Constant into the Middle Dial. Place the first number to be added to it in Keyboard Dial and touch "1" key of Multiplier Keyboard (or on D models touch X Bar). Copy answer. Depress Subtract Bar to restore the Constant in the Middle Dial.

DUAL ADDITION (Method A)

When numbers are small, the extreme left of the Keyboard Dial may be used for adding one column and the extreme right for adding a second column, one depression of the Add Bar sufficing for both additions.

DUAL ADDITION (Method B)

When the numbers are large, the set-ups in the Keyboard Dial are made at the right and the numbers are added to either of two groups in the Middle Dial. The first group accumulates at the right of the Middle Dial when the carriage is shifted to extreme left. The second group accumulates at left of the Middle Dial when carriage is shifted to extreme right. This method is useful for accumulating debits and credits separately as a ledger page is being scanned. Marchant's Selective Carriage Tabulation is indispensable in shifting the carriage back and forth in such work.

SIMULTANEOUS KEY DEPRESSION

Those having much adding to do will save time by setting up small amounts by a single depression. In the case of large amounts, several figures may be set as a group by a single downward stroke. At the instant of releasing the fingers from the right-hand group, the little finger of the right hand touches the Add Bar as the eye glances upward to check the amount in the Keyboard Dial.

INTERRUPTIONS

The Upper Dial is an item counter which should be cleared as each page is turned. It will then show the number of items added. If interrupted, depress keys for the next number but do not touch Add Bar. The location of the number can always be identified on the page because it is one more from start than the reading of Upper Dial.

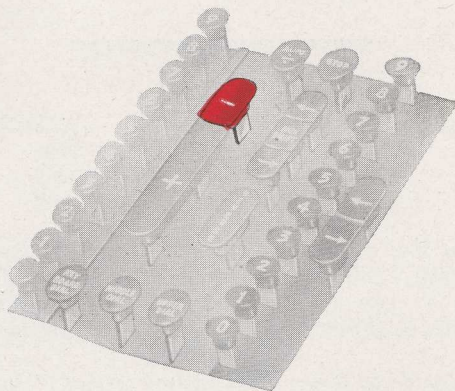
ACCURACY CONTROL

Marchant's Keyboard Dial provides the same visual proof as is obtained with a listing machine. The audit principle is the same, except Marchant visual comparison is made at time of entry instead of after completion of all entries.

CORRECTION OF IMPROPER SET-UPS

The Keyboard Dial enables quick glance checking of all entries. To correct, it is only necessary to depress the key showing the correct digit in the column that bears the incorrectly set digit. *This may be done during or after entry, but before addition is made.*

Direct Subtraction



Example of Marchant Normal Automatic Subtraction:

$\begin{array}{r} 3175 \\ - 655 \\ \hline 2520 \end{array}$	Add 3175. Set 655 in Keyboard Dial; touch the red Subtract Bar. The remainder, 2520, will instantly appear in Middle Dial, and the Keyboard Dial automatically clears.
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AUTOMATIC REPEAT SUBTRACTION

Automatic Repeat Subtraction is performed in the same manner as Automatic Repeat Addition (Page 15), except by depressing the Subtract Bar instead of Add Bar.

Example:

$\begin{array}{r} 7406 \\ 3503 \\ 6890 \\ 1022 \\ \left[\begin{array}{l} -2356 \\ -2356 \\ -2356 \\ -2356 \end{array} \right] \\ 1655 \\ \hline 11052 \end{array}$	Place 7406 in Keyboard Dial; touch Add Bar. Continue with the three succeeding items to be added. Place 2356 in Keyboard Dial; depress simultaneously the Subtract Bar and "4" key of the Multiplier Keyboard. 2356 will be automatically subtracted four times and cleared from the Keyboard Dial, leaving the calculator ready for the next operation.
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On Model D, use the Short-Cut Bar for repeated subtractions, checking with Upper Dial Item Counter.

AUTOMATIC LOCKED FIGURE SUBTRACTION

When it is desired to have the number being subtracted remain in Keyboard Dial, the "locked figure" method is followed in the same way as described for the corresponding plan of Addition, except that the Reverse Bar is depressed prior to touching "1" Key of Multiplier Keyboard (on Model D touch Short Cut Bar).

USEFUL HINTS FOR SUBTRACTION

As Subtraction is similar to Addition, many of the useful hints relating to Addition apply equally to Subtraction.

SUBTRACTING A CONSTANT

Example:

Find Net Weight.		
Gross Weight	Tare	Net Weight
1250	110	1140
2625	110	2515
1468	110	1358

With Non-Shift Key depressed, subtract the Constant, 110. Place in Keyboard Dial the amount, 1250, from which the Constant is to be subtracted. Add by depressing the "1" key of the Multiplier Keyboard, and read answer in Middle Dial. Depress Subtract Bar, restoring the Constant (in its complementary form).

On Model D use X Bar instead of the "1" Key.

SUBTRACTING FROM A CONSTANT

Example:

$$\begin{aligned} 125.50 - 26.40 &= 99.10 \\ 125.50 - 87.50 &= 38.00 \\ 125.50 - 50.40 &= 75.10 \end{aligned}$$

With Non-Shift Key depressed, add the constant, 125.50. Place in Keyboard Dial the first number to be subtracted, 26.40. Subtract by depressing Reverse Bar and "1" key of Multiplier Keyboard, and read answer in Middle Dial. Depress Add Bar, restoring the constant.

On Model D use Short-Cut Bar instead of Reverse Bar and "1" Key.

BALANCING DEBITS AND CREDITS

Add the debits and credits, using Dual Addition (Method A or B), adding debits at left of Middle Dial and credits at right. Set up in Keyboard Dial whichever of the two totals is the smaller. Shift carriage so as to bring this set-up directly below other total, and subtract. Copying the total to the Keyboard Dial may be expedited by shifting carriage so the amount to be transferred to Keyboard Dial is directly above where it is to be located in Keyboard Dial. This alignment of dials permits instant visual comparison to insure correctness of transfer; or, as a double check, a depression of Reverse Bar and "1" key of Single Row Keyboard clears Middle Dial. If it should not clear to ciphers, an error in transferring was made.

SUBTRACTING WHEN SMALLER AMOUNT IS IN MIDDLE DIAL

With Non-Shift Key depressed, duplicate the Middle Dial amount in Keyboard Dial and depress Reverse Bar and "2" key of Multiplier Keyboard. Change Keyboard Dial reading to that of the larger number and touch Add Bar. The desired remainder appears in Middle Dial.

On Model D, use the Short-Cut Bar, touching it twice, instead of the "2" key.

CONTINUING ADDITION AND SUBTRACTION

It is obvious that any number may be either added or subtracted, depending upon whether the Add Bar or Subtract Bar is depressed. Balancing of debits and credits need not be made by totaling each, provided such totals are not needed, as the balance can be directly obtained by adding debits and subtracting credits as they occur. When there is a credit balance it appears in a negative form, which must be evaluated as a true figure amount as below:

FINDING THE TRUE VALUE OF A NEGATIVE NUMBER

In the following example the total credits exceed the total debits. The result is a credit balance. This negative total appears in Middle Dial. It may be changed to the "true" figure amount by "writing" 76 and one or more of the 9's to its left in the Keyboard Dial, and subtracting twice by depressing Reverse Bar and "2" key of the Multiplier Keyboard.

On Model D, touch Short-Cut Bar twice instead of Reverse Bar and "2" Key.

Example:

		<i>Credit Balance</i>	
		82 Dr.	
		—97 Cr.	
		24 Dr.	
		—33 Cr.	
		<hr/>	
Middle Dial	9999999999999999	Negative Total	
Keyboard Dial	—9976	Subtract Twice	
		<hr/>	
Middle Dial	24	True Credit Balance	

UPPER DIAL ADDITION OR SUBTRACTION

It is often desired to add to or subtract from amounts that may be in the Upper Dial. This may be done by having a clear Keyboard Dial and multiplying or reverse multiplying by the amount that it is desired to add or subtract (see Page 23).

INTERMINGLING TYPES OF CALCULATING

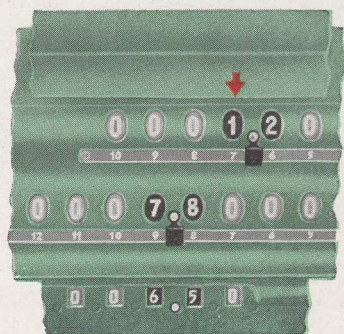
Marchant designers have given special attention to making it simple and easy to operate the Marchant when it is necessary to change back and forth between addition, subtraction, multiplication, and division. This is especially desirable because of the constant intermingling of these types of figure work in modern offices.

On the Marchant this is accomplished by eliminating pre-conditioning of the calculator as the operator changes from one type of work to another. There is no "repeat-key" to set or to forget to set, etc. If the Upper green Shift Key (on M models) is kept continuously down, and multipliers are entered in the usual way "from the left" (see bottom of Page 23), the Marchant will add or subtract by either normal or "locked-figure" method, and multiply and divide without its being necessary to touch a single pre-conditioning key. The Marchant is Always Ready!

Pre-Set Decimal System

This decimal system is used on all Marchants. Certain models are also equipped with Orange Decimals as described on the next page.

All three Dials and Keyboard have conspicuous white decimal markers. Pre-setting these eliminates guesswork and error in correctly pointing off the result.



The simplest method of setting decimals is one which requires minimum mental effort on the part of the operator.

1. Determine the number of decimals necessary for the keyboard amount. Flip over the Keyboard Guide at that position. This automatically sets the decimal in Keyboard Dial.

2. Set Upper Dial decimal a sufficient number of positions from the right to accommodate that amount regardless of whether it is to be a multiplier or a division-quotient. Your type of problem has definitely directed the setting of decimal points in this and the preceding paragraph.

3. Position the carriage so that Red Carriage-Position Indicator points to the first dial to the left of the decimal in Upper Dial. Then slide Middle Dial decimal to a position directly above the decimal in Keyboard Dial.

When amounts are "written" around pre-set decimal points, the answer is automatically pointed off in both multiplication and division.

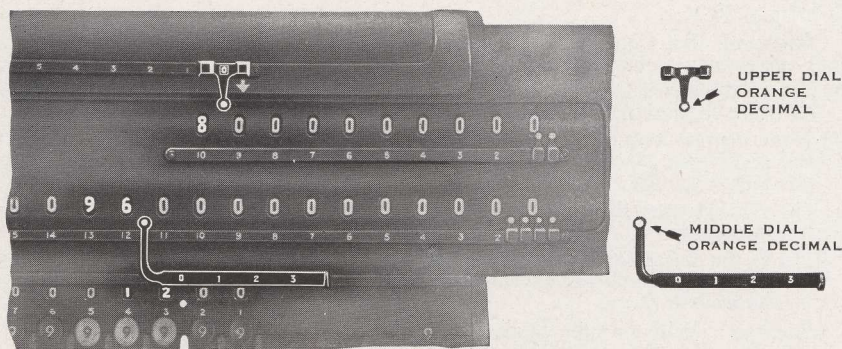
This simple Pre-Set Decimal System eliminates mental adding or subtracting by the operator. However, if it be desired to set decimals "by rule" instead of by this simple "lining-up" process, the usual rules apply as follows:

Number of Middle Dial decimal places *equals* number of Upper Dial places *plus* number of Keyboard Dial places, and

Number of Upper Dial places *equals* number of Middle Dial places *minus* number of Keyboard Dial places.

The Orange Decimals

Supplemental to the decimals described on Page 20. Used as regular equipment on certain models but optionally available on any model.



Multiplication, in which the multiplier is entered into the calculator as one reads, writes, or thinks the amount—instead of entering it “backwards”—is aided by supplemental decimals available on many Marchant models.

This added feature comprises orange colored decimals for Upper and Middle Dials which do not travel with the carriage as do the white decimals, but instead remain fixed with relation to the body of the calculator—the carriage gliding beneath the decimals. These supplemental decimals are designated as “Orange Decimals” to distinguish them from the white decimals described on Page 20.

The orange decimals are adjustable to accommodate various problems, but when once positioned remain so during an entire series of calculations. They are designed for use with single multiplications and do not supersede the white decimals for accumulative multiplications (see Pages 24 and 25).

SETTING THE ORANGE DECIMALS

- (1) Set decimal for the Keyboard Dial factor exactly as in par. 1, page 20. The use of Orange Decimals does not require any change in the method of setting this decimal.
- (2) Set Upper Dial Orange Decimal (see illustration) so that the position number that appears in the window-opening of its marker equals the greatest number of digits at right of decimal of the series of multipliers in the calculating to be done. (See Note 3 on Page 22.)
For example: If multipliers are
 - (a) Whole numbers only, set Upper Dial Orange Decimal at “0.”
 - (b) Not longer at right of decimal than 3, such as in the series 57.258, 59.5, 750., 38.007, 861.4, 5.109, .007, set Upper Dial Orange Decimal at “3.”
- (3) Set the Middle Dial Orange Decimal so that the number on its slide corresponding to the position number of the Upper Dial Orange Decimal, lies directly above the Keyboard Dial Decimal.

NOTE: The illustration at top of page shows the setting when multipliers are whole numbers; i. e., amounts that contain no digits at right of decimal, such as 18, 1900, 4, etc. Following Rule 2(a) above, decimals are set at “0.”

HOW TO MULTIPLY WHEN USING ORANGE DECIMALS

On all "M" models, the Upper Green Shift Key should be down. On all "D" models, depress Upper Black Shift Key a single tap between digits of multiplier.

The preferred starting position for all multiplications is with carriage at its extreme right, or at a selected intermediate carriage position on models according to tab-key setting.

TO MULTIPLY:

Assuming that Orange Decimals are set for the work to be done (see preceding page) and carriage is in starting position:

- (A) Set up Keyboard Dial factor in the customary way, so it appears "written around" its white decimal in the Keyboard Dial.
- (B) Next, depress keys of Multiplier Keyboard on "M" models (or use X and Short-Cut Bar and Upper Black Shift Key on "D" models), entering the multiplier according to the following rule:
 - (a) Always enter the left-hand digit of multiplier first, following with next succeeding digits.
 - (b) If the multiplier is not of sufficient length to "fill out" to the number of places at right of decimal for which the Orange Decimals are set, enter sufficient ciphers to make it do so.

Example: With Orange Decimals set at "3," the following multipliers would be entered in the manner described:

<i>Multiplier</i>	<i>Enter as</i>	<i>Multiplier</i>	<i>Enter as</i>
57.258	5-7-2-5-8	861.4	8-6-1-4-0-0
59.5	5-9-5-0-0	5.109	5-1-0-9
750.	7-5-0-0-0-0	.007	7
38.007	3-8-0-0-7	.04	4-0

After such entries, the multiplier will appear properly pointed off by the Upper Dial Orange Decimal, and the answer will appear properly pointed off by the Middle Dial Orange Decimal. The Keyboard Dial factor continues to stand as properly pointed off in its dial.

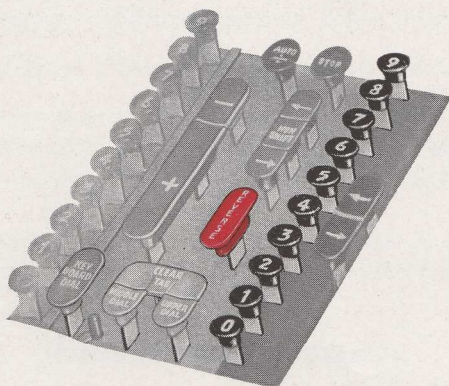
USEFUL HINTS WHEN USING ORANGE DECIMALS

- (1) When there are multipliers which would appear to require the entry of a great number of ciphers, such as in the case of the 750 of the above list, it is sometimes more convenient to enter only the significant digits of the multiplier (in this case 7-5) and then hold down Upper Black Shift Key until the Upper Dial Orange Decimal properly points off the multiplier (in this case 750.). The answer will then be pointed off by the Middle Dial Orange Decimal.
- (2) In checking readings, see that the Upper Dial Orange Decimal always points off the multiplier. In the case of multipliers of the nature of .007 of the above list, if multiplication is started with carriage at extreme right, the checking of the number of ciphers that precede the "7" may be done by noting the position of the "7" in its relation to the Upper Dial Orange Decimal, or, if desired, such multipliers may be entered as 0-0-7, in which case the multiplier will appear as .007.
- (3) In cases where there is an infrequent multiplier which has an extra-large number of digits at right of decimal, it is not necessary to set the Orange Decimals to conform to this extra-length multiplier, as to do so would require the entry of an extra-large number of following ciphers on all multipliers of ordinary length. In such a case, enter the significant figures of the extra-length multiplier. Then hold down Lower Black Shift Key until multiplier is properly pointed off by Upper Dial Orange Decimal.

Example: If with a setting of "3," an infrequent multiplier is encountered such as 38.3456789, merely enter the digits in order, and upon completion hold down Lower Black Shift Key until Upper Dial Orange Decimal points to its proper position following "38." The answer in Middle Dial will then be properly pointed off.

- (4) When starting a multiplication at an intermediate position, be sure that there is room to enter the entire multiplier including, in the case of M models, provision for an extra shift following the last digit of multiplier.

Automatic Multiplication



Multiplication on the *Silent Speed* Model ACR-8M or ACT-10M Marchant is the fastest known. The first factor is set up in the keyboard and checked for accuracy of entry in the Keyboard Dial. The second factor is then entered in the Multiplier Keyboard. Simultaneously with entry the Marchant is doing the multiplying, so that upon entry of the final figure of the second factor the answer is instantly completed—appearing in the Middle Dial—in a flash! Correctness of entry of multiplier is checked in Upper Dial.

(1st Factor)		(2nd Factor)		(The Answer)
<i>Multiplicand</i>		<i>Multiplier</i>		<i>Product</i>
45678	×	3456	=	157863168

Multiplicand: A number to be multiplied.

Multiplier: A number by which another is multiplied.

Product: The result of a multiplication.

Example: $45678 \times 3456 = 157863168$

With carriage shifted so that Red Carriage-Position Indicator is above Dial "4" and with Upper green Shift Control Key depressed, set-up 45678 in Keyboard Dial. Touch Keys of Multiplier Keyboard, first "3," then "4," then "5," and then "6." The Marchant "writes" the product 157863168, in the Middle Dial, which is completed when the "6" is touched.

SEE TOP OF PAGE 22 FOR HIGH-SPEED METHOD OF MULTIPLYING
ON MODELS EQUIPPED WITH ORANGE DECIMALS

*Also, see next page for method sometimes used in which
multipliers are entered backwards; i. e., "from-the-right."*

An alternate method of multiplying is with Red Carriage-Position Indicator above Dial "1," and Lower green Shift Control Key depressed, set up 45678 in Keyboard Dial and "write" 6-5-4-3 with keys in Multiplier Keyboard. This procedure is called "entering multipliers from-the-right."

Marchant's flexibility makes it easy to multiply in either direction.

The Marchant starts multiplying instantly with depression of the key for the first figure of the multiplier. You may "write" the multiplier ahead of the operation, for the Marchant will remember each figure and finish the problem.

On Model D use the Multiplier Bar to "build up" the multiplier in the Upper Dial, moving the carriage in either direction with Electric Carriage Shift Bars.

ACCUMULATIVE MULTIPLICATION

If, in the above examples, the Middle Dial had contained an amount, such as the answer of a preceding multiplication, the new product would have been added to the previous answer. This is useful in checking invoices or other types of work where it is unnecessary to prove the extension of each individual item. Much time is saved by allowing products to accumulate in the Middle Dial and checking only the total.

REVERSE OR SUBTRACTIVE MULTIPLICATION

Accumulative multiplication *adds* the new product to an amount which may be in the Middle Dial. Similarly, Reverse or Subtractive multiplication *deducts* the new product from an amount which may be in the Middle Dial.

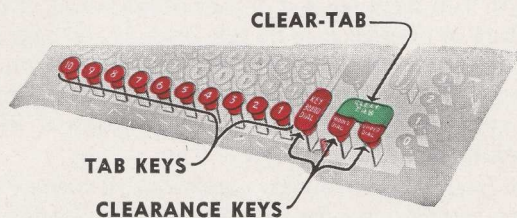
For reverse or subtractive multiplication, merely depress the red Reverse Bar before you depress the key of the Multiplier Keyboard.

If the Reverse Bar is inadvertently depressed, it may be released by depressing the Division Stop Key.

In reverse multiplication, the Upper Dial will show the complement of the multiplier unless the Upper Dial already contains an amount, in which case the multiplier will be subtracted from such amount. If the Upper Dial is clear and it is desired to have it indicate the true multiplier, the Manual Counter Control (see Page 13) should be moved toward the operator.

On Model D, reverse multiplication may be obtained by using the Short-Cut Bar, moving the carriage in either direction with Electric Carriage Shift Keys.

ACCUMULATIVE MULTIPLICATION ON MODEL ACT-10M



Normal multiplications of two factors, the products of which are to be individually shown; that is to say, not added to or subtracted from previous Middle Dial amounts, are best made by the method shown at top of Page 22, using the Orange Decimals.

If, however, the products are to be accumulated, the Tab Keys of Model ACT-10M enable the work to be done in an extremely fast manner, provided the routine outlined below is followed.

Example:

Piece-Work Tickets		
1425 pcs.	.75 per C	}
638	1.86	
4250	.085	
381	3.75	
735	.875	
		46.89

Decimals: Upper Dial 3, Middle Dial 5, Keyboard Dial 2.

1. Set up in Keyboard Dial the first quantity as 100's (14.25) and depress No. 3 Tab Key which instantly tabulates carriage to 3rd position.

2. Glance at multiplier (.75) and also note that the next multiplier has its left-hand figure one place to the left of that of the multiplier being read. Think of the multiplier (75) as "75 one-to-the-left," and enter 75 in Multiplier Keyboard, instantly thereafter letting a finger* drop into the "notch" formed by the already depressed No. 3 Tab Key. Then feel along "one to the left" and make a partial depression (until it clicks) of the key that is "one to the left"; viz., the No. 4 Tab Key.

3. Next, touch Clear-Return Key as a part of clearing Upper and Keyboard Dials. The carriage automatically tabulates to 4th position.

4. Set up in Keyboard Dial the next quantity (6.38) and glance at multiplier, similarly thinking of it as "186 two-to-the-right." After entering 186 let a finger* drop into the "notch" formed by the depressed No. 4 Tab Key and feel along "two to the right" and make partial depression of the key that is "two to the right"; viz., the No. 2 Tab Key. The carriage will then tabulate to 2nd position when dials are cleared all ready for the third multiplication. Proceed in this manner for the balance of the work.

*If Marchant is operated with the right hand, the thumb is convenient for this purpose; if operated with left hand, the third or fourth finger may be used.

MULTIPLICATION AIDED BY CARRIAGE TABULATION

The Tab Keys greatly aid multiplication, regardless of whether the orange decimals or the white decimals are used.

On models with Tab Keys located at base of keyboard, if white decimals are used, the procedure of page 25 may be followed, or carriage may be positioned by full depression of proper tab key, or a partial depression (see Page 13) of key for average-length multiplier may be made. In the latter case carriage will return to such average position, subsequent adjustment, if necessary, being made by the black Carriage Shift Keys.

On ACR-8M model, under similar conditions, if upper Green Shift Key is down, the Tab Key suitable for the average-length multiplier, as well as all Tab Keys at left thereof, should be down. Depression of Clear-Return Key causes carriage to return to the position suitable for average-length multiplier. Those which are shorter are then prefixed by one or more ciphers in the entry and those that are longer are prefixed by one or more taps on Clear-Return Key.

TABULATION ON MODELS WITH TABULATION KEYS ON CARRIAGE

Whereas the Instant and Selective Carriage Tabulation on the ACT-10M model causes the carriage to shift automatically from any position to any position, in either direction, the ACR models, which have Tab Keys on the carriage, have somewhat less flexibility of action. The tabulation shift on such models, if made to an intermediate position as indicated by a depressed Tab Key, takes place only when the carriage is set to shift to the right, as evidenced by the Upper Green Shift Key being down on ACR-8M model, or by the Carriage Return Control (at top of control panel) being positioned at *right* on D models.

If the Lower Green Shift Key is down on ACR-8M models, or if the Carriage Return Control is positioned at left on D models, the carriage automatically returns to first position upon depression of Clear-Return Key. This is true regardless of any Tabulation Keys which may be depressed.

CORRECTING ERRORS IF MADE BY OPERATOR WHEN ENTERING MULTIPLIER

Correction of improper settings of multiplier in the Multiplier Keyboard is just as simple as correcting multiplicand set-ups in the Keyboard Dial (see bottom of Page 16). As the multiplier is entered it appears instantly in Upper Dial. Regardless of whether the error of entry is noticed during or after complete entry of multiplier, the same simple method of correction applies. Point the Red Carriage-Position Indicator to the digit that is incorrect. If it is too small, depress the key of the Multiplier Keyboard marked for the amount that the dial reading is too low; thus, if dial reads 6 and it should read 8, depress "2" key. Similarly, if the dial reads 6 and it should be 3, depress the Reverse Bar and "3" key.

ILLUSTRATIVE PROBLEMS APPLYING TO MARCHANT MULTIPLICATION

Only a few problems are shown on the following pages. The Marchant is extremely versatile and capable of offering all of the short-cut methods that ordinarily prevail in the calculator art, and also contributing many more which its special construction renders exclusively.

Most of these illustrative examples are described with use of white decimals (Page 20). When there is much repetition of a single type of work, the advantages of Selective Carriage Tabulation and the orange decimals (Page 22) should be considered.

In many of the problems to follow, the greatest number of decimals is five in the Keyboard factor and four in the multiplier. Decimals will therefore be set at 5 in Keyboard Dial and 4 in Upper Dial to accommodate these factors. Following the rules already given, the Middle Dial decimal will be set at 9, and such problems will be worked around those decimals. (See illustration below.)



Example:

$$\begin{aligned} 75.25 &\times 2.125 = 159.90625 \\ 17.1225 &\times 25.125 = 430.2028125 \\ 136.255 &\times 536.1 = 73046.3055 \end{aligned}$$

The above three problems are calculated without change of the decimal markers. This illustrates the customary practice of calculating with reference to "pre-set" decimals. Oftentimes an entire day's work involving a wide variety of calculating can be handled by the use of a single pre-setting of decimals.

SUBTRACTING A PRODUCT BY REVERSE MULTIPLICATION

Example:

$$(15.73 \times 74) - (4.52 \times 33) = 1014.86$$

Multiply 15.73 by 74. Clear Upper Dial and Keyboard Dial, and move Manual Counter Control toward the operator. Make the second multiplication "in reverse" by use of Reverse Bar and keys of Multiplier Keyboard, automatically subtracting the second product. This method is useful, for example, in calculating and simultaneously deducting discounts or freight allowance.

On Model D, use Short-Cut Bar for the second multiplication.

SHORT-CUT MULTIPLICATION*(Model D only)*

The "Short-Cut" Bar (see Page 7) on the Model D Marchant is a distinct advantage and an added time saver. When digits higher than 6 appear in the multiplier, this Short-Cut method may be used.

Example:

$$318.6 \times 87.6 = 27909.36$$

With carriage in fourth position, set 318.6 in Keyboard Dial around the decimal. Depress Short-Cut Bar until 0 in fourth position Upper Dial is reduced down to 6.

Shift to fifth position. Depress Short-Cut Bar twice, reducing 9 in Upper Dial to 7.

Shift to sixth position. Depress Short-Cut Bar once, reducing 9 in Upper Dial to 8.

Shift to seventh position. With one stroke of Multiplier Bar the remaining 9's are eliminated from the dials, giving the answer, 27909.36, in Middle Dial.

DOUBLE MULTIPLICATION—INVOICE CHECKING

Two amounts may be multiplied by the same multiplier in one operation. In entering invoices of incoming merchandise, many stores show both cost and selling price on the invoice and require both columns to be extended.

Example:

<i>Quantity</i>	<i>Selling Price</i>	<i>Amount</i>	<i>Cost Price</i>	<i>Amount</i>
28	1.85	51.80	1.35	37.80
14	.98	13.72	.87	12.18
21	3.65	76.65	2.45	51.45
105	.67	70.35	.45	47.25
96	.55	52.80	.33	31.68

Set "Selling Price" at left of Keyboard Dial. Set "Cost Price" at right of Keyboard Dial, and multiply by the quantity indicated, obtaining simultaneously in Middle Dial the total selling price at the left and the total cost price at the right. Pre-set decimals for both Keyboard Dial positions with corresponding double setting of Middle Dial decimals.

If all the items are to be charged to one department, it is not necessary that their respective amounts be listed. The totals of cost and selling price are then permitted to accumulate in Middle Dial, so upon completion only the total debits to department inventory at retail and cost are shown. The total cost debit also acts as a check of vendor's invoice, making it unnecessary to check it separately.

This application may be easily modified to accommodate discounts, transportation, and proportionate surcharges. For further details ask for Marchant Methods MM126 and 126A.

ACCUMULATION OF MULTIPLIERS WITH PROOF OF EACH

A useful application frequently employed in invoicing is the simultaneous extension and totaling of items.

56 cases @ 4.62	On 10 column Marchant set
18 cases @ 9.24	decimals: Upper Dial 0, Mid-
7 cases @ 3.22	dle Dial 9 and 2, Keyboard
—	Dial 9 and 2.
81	447.58

Place "1" at extreme left of Keyboard Dial as a permanent setting. Set up 4.62 at right of Keyboard Dial and multiply by 56. Clear Upper Dial only. Change Keyboard Dial at right to 9.24 and multiply by 18. Similarly clear Upper Dial, change Keyboard Dial at right to 3.22 and multiply by 7.

Middle Dial shows at left the total number of cases and at right the total invoice.

If it is desired to show individual extensions, change procedure by clearing Middle Dial after each multiplication instead of clearing Upper Dial. Upon completion the Upper Dial will show Total Cases and the individual proof of each multiplier entry will appear in Middle Dial at the left.

MULTIPLICATION OF THREE OR MORE AMOUNTS

With all dials in perfect alignment, and complete carry-over to the full capacity of the carriage, the *Silent Speed* Marchant is ideally adapted to such problems:

Example: $413 \times 343 \times 565 = 80037335$

With decimals at extreme right of dials, set up 413 in Keyboard Dial and multiply by 343. Result in Middle Dial is 141659. With carriage in first position, copy this result in Keyboard Dial, making visual comparison as dials are in perfect alignment clear Middle Dial. As a double check the Middle Dial may be cleared to ciphers by reverse multiplying by "1" (or touch Short-Cut Bar on Model D). If Middle Dial does not clear to ciphers, an error of transferring was made. Clear Upper Dial and multiply by 565.

Another useful method is to set 413 at left of Keyboard Dial and 343 at right, and multiply by 565. The product of 343 and 565 appears at right of Middle Dial. Clear the 343 from Keyboard Dial and build up Upper Dial reading until it equals the amount at right of Middle Dial. Perfect three dial alignment makes this easy. The answer appears at left of Middle Dial. This method is limited to cases in which the sum of the number of figures in all three amounts does not exceed the capacity of Keyboard Dial. It is particularly useful if one amount is a constant, in which case the constant is set up at left of Keyboard Dial.

MULTIPLYING WHEN ONE AMOUNT IS A CONSTANT

The Marchant has a separate keyboard for each of the amounts of a multiplication, so it is unnecessary to provide complicated means for storing the constant while the second amount is being set up, as would be required if only one keyboard were available.

The constant is set up in Keyboard Dial (on most models there are means of locking it in place to prevent accidental clearance). Multiplication is then made on M models by entering the variable second amounts in the Multiplier Keyboard as multipliers, reading answers from Middle Dial, and clearing only Upper and Middle Dials upon completion of each problem. On D models, if the successive multipliers are similar, it is often easier to convert one to another by building up or down in the Upper Dial. When the Upper Dial displays the new multiplier, the Middle Dial displays the new product.

In special cases when the constants are of only a few figures, and the variable amounts have large numbers of figures, time may be saved by multiplying as an ordinary two-factor multiplication, setting the long variable amounts in Keyboard Dial and multiplying each time by the short-length constant.

PERCENTAGE PRO-RATING OR DISTRIBUTION

A frequent example of multiplying when one factor is a constant is in percentage pro-ration:

Example:

Find percentage of department expense to total expense.

Monthly expense, department A	\$ 125.00	4.14%
" " " B	250.45	8.29
" " " C	1255.55	41.55
" " " D	650.35	21.52
" " " E	740.25	24.50
	<u>\$3021.60</u>	<u>100.00%</u>

By division (see Page 36) it is found that \$1.00 of expense is .0330950% of \$3021.60. The per cent of expense for department A is obviously $125 \times .0330950$ or 4.14%. The amount .0330950 is set up in Keyboard Dial as a constant, and multiplied in turn by the departmental amounts, thus producing the percentages. Ask nearest Marchant Agency for Marchant Methods MM321 and MM 275 describing rapid short-cut methods for this type of work.

Sometimes it is desired to provide a control proof so that at end of computation the calculator shows the accumulated percentages (100.00). It is easy to do this on the Marchant, but inasmuch as such control proofs do not prove transcribing to the work sheet, it is obvious that true control requires that the amounts be added *after* transcribing. It is therefore believed undesirable to depend upon any machine proof control. The final additions after transcribing prove both transcribing and calculating.

SIMPLE DISCOUNT

Example:

Amount \$535.50	Discount 15%	Net \$455.175
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Multiply 535.50 by 1 (100%), using the "1" Key of Multiplier Keyboard. Then multiply by .15 in reverse, using Reverse Bar and keys of Multiplier Keyboard. The net amount of \$455.175 appears in Middle Dial and the net percentage .85 in Upper Dial. The same result will be secured by multiplying 535.50 by .85 (100%—15%).

On Model D use Multiplier Bar and Short-Cut Bar

Applying "Double Multiplication" to discounting (see Page 28), the amount of discount and net after its deduction may be obtained simultaneously.

Example:

<i>Amount</i>	<i>Discount "off" 15%</i>	<i>Discount "on" 85%</i>
470.55	70.58	399.97 (the net)

This is useful when a number of items have the same discount. With suitable decimal set-up, the discount "off" (.15) is set up at right of Keyboard Dial. The discount "on" (.85) is set up at the extreme left. Multiplying by each of the amounts in turn produces the amounts of discount at right of Middle Dial and net after deduction of discount at left.

CHAIN DISCOUNT

Example:

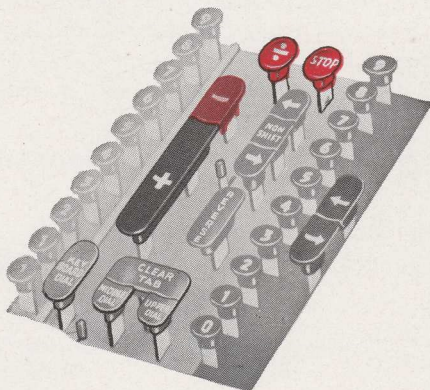
Find net amount of \$465.75 less discount of $12\frac{1}{2}$ —5— $2\frac{1}{2}$ %
(With 4-9-5 decimal set-up as shown on Page 25)

Multiply 465.75 by 1. Clear Upper Dial. Move Manual Counter Control toward the operator. By Reverse Multiplication (see Page 27) "write" .125 in Upper Dial. Copy in Keyboard Dial from Middle Dial, 407.53125. Clear Upper Dial. By Reverse Multiplication "write" .05 in Upper Dial. Copy in Keyboard Dial from Middle Dial 387.15469. Clear Upper Dial. By Reverse Multiplication "write" .025 in Upper Dial. Net amount, \$377.48, is in Middle Dial.

CHAIN DISCOUNT WHEN USING TABLES

The Decimal Equivalent of a Chain Discount is obtained by subtracting from "1" the net amount after deducting the chain discount from "1." Tables of the usual Chain Discounts, the decimal equivalents of the discounts, and of the complements of discounts, are available upon request (ask for Marchant Tables 14 and 14A). Multiplying any amount by the decimal equivalent of the chain discount gives the amount of discount, and similarly multiplying by the decimal equivalent of the complement of the chain discount gives the net after deduction of discount.

Automatic Division



Marchant Automatic Division performs all division problems automatically and electrically at the touch of a key. It gives instant results with unequalled simplicity and ease.

Definition of Terms:

Dividend: A number to be divided by another.

Divisor: A number by which another is divided.

Quotient: The result of a division.

Example:

<i>Dividend</i>	<i>Divisor</i>	<i>Quotient</i>
3928.45	31.6	124.318

Decimals: Upper Dial 3, Middle Dial 5, Keyboard Dial 2.

With carriage in 4th (units) position, set up 3928.45 in Keyboard Dial and touch Add Bar. (On earlier models it is necessary to clear Upper Dial by touching either the Subtract Bar or the Upper Dial Clearance Key.)

Set up 31.6 in Keyboard Dial. Move carriage until the left-hand digit of the dividend is directly above the left-hand digit of divisor, the same as pencil and paper method.

Depress Automatic Division Key and the Marchant automatically completes the division, the quotient 124.318 appearing in True Figures in the Upper Dial.

The dividend, in this case, is not equally divisible by the divisor, so the quotient appears with a decimal fraction which may be extended to as great a length as desired by arranging more decimal places in the Upper Dial and correspondingly increasing the decimal places of the Middle Dial (see Page 20).

AUTOMATIC CLEAR-RETURN IN DIVISION

On models designated by the symbol ACT or ACR, it is not necessary to touch Clear Keys or Clear-Return Key upon completion of each division. As soon as the quotient is formed, the Middle Dial and Keyboard Dial automatically clear and the carriage automatically returns to the position for which the tab key is set. This action takes place whenever the small lever, adjacent to the Add Bar, is in vertical position. If it is inclined away from the operator, the clear-return feature is inactive, thus permitting the remainder to show in the Middle Dial.

USE OF TABULATION KEYS

On models with tab keys, whether located at base of keyboard or on carriage, depress the key marked with the number corresponding to the "units" position of the Upper Dial ; i.e., the position at the left of Upper Dial decimal marker. Carriage will then, on models equipped with Automatic Clear-Return, return automatically to the "units" position upon completion of any division. This greatly simplifies any series of such divisions.

On Page 34 there is described a method of performing a series of successive divisions without need of lining up left-hand figures of dividend and divisor before the Division Key is depressed. This method is made possible by the flexibility of the tab keys, and constitutes one of the principal advantages arising from their use.

OPTIONAL DIVISION STOP

Any time sufficient quotient appears, the division may be stopped by depressing the Stop Key. If the feature of Clear-Return-in-Division is not in use, as indicated by the small lever at right of Add Bar being inclined away from operator, the division may be re-started to provide additional figures of quotient by holding down Stop Key just prior to depressing Division Key, and releasing it just prior to releasing Division Key. This simple two-finger "rolling motion" disables the automatic clearance of Upper Dial prior to division.

ACCUMULATION OF QUOTIENTS

When new quotients are to be added to previous Upper Dial amounts, the Division Key should be depressed in the manner that will not cause Upper Dial to clear, using the process described in the above paragraph. Also, when entering each successive dividend, the Subtract Bar should be depressed after depressing Add Bar.

**PERFORMING A SERIES OF DIVISIONS
WITHOUT LINE-UP OF LEFT-HAND DIGITS OF DIVIDEND AND DIVISOR**

Successive divisions may proceed without the necessity of lining up left-hand digits of dividend and divisor, provided decimal markers are so placed that dividend and divisor are each set up around its own Keyboard Dial decimal. The example below illustrates this method as applied to models with Selective Carriage Tabulation.

Example:

ENGINEERING ESTIMATES			
	<i>Dividend Cost</i>	<i>Divisor Units</i>	<i>Cost per Unit</i>
Section A	64327.25	125.25	513.59
Section B	896.42	14.7	60.98
Section C	8372.84	8.55	979.28
Section D	3324.68	685.2	4.85

It will be noted that if any of the above divisors are laid over corresponding dividends so decimal points coincide, the dividends are longer than the divisors by 2, 1, 3, and 1 digit respectively. The greatest of these is "3," which is designated "the spread."

Set Keyboard Dial decimal at 2 for entering dividends and at 5 for entering divisors. The "divisor decimal" is always at left* of the "dividend decimal" by an amount equal to the "spread." Locate Middle Dial decimal by applying procedure of Page 20, but using the "divisor decimal" of Keyboard Dial as the one from which Middle Dial decimal is lined up. The conditions of this problem require pointing off three decimal places in the Upper Dial, so the Middle Dial decimal is placed at 8.

Next shift carriage until Middle Dial decimal is directly above the "dividend decimal" of the Keyboard Dial. Note the Upper Dial number to which Red Carriage Position Indicator now points (in this case 7). Depress tab key marked with this number. This is the permanent starting position and the carriage will always tabulate to the 7th position after each division.

With such a setting, division can proceed without lining up left-hand digits, provided dividends are set around the 2nd Keyboard Dial decimal and divisors are set around the 5th Keyboard Dial decimal.

*If divisors are longer than dividends, division may be performed without the necessity of lining up left-hand digits even though a "spread" decimal setting is not used. The carriage will merely shift automatically through the preliminary positions. However, in certain types of work the "spread" system will aid the operation. In such a case, the "dividend decimal" is placed to the left of the "divisor decimal" by an amount equal to the *least* spread. The above rules then apply.

**STOPPING DIVISION WHEN OPERATOR
FAILS TO LINE-UP LEFT-HAND FIGURES OF DIVIDEND AND DIVISOR**

Sometimes the operator may neglect to shift carriage to line-up left-hand figures of dividend and divisor prior to depression of Division Key. This will cause the mechanism to operate but the carriage may not start its shift from order to order to develop successive quotient figures. In this case, depress Stop Key twice. The problem may then be reset.

FINDING PERCENTAGE

Example:

What per cent of \$834.00 is \$191.82?

Simply divide \$191.82 by \$834.00 and the result, .23 or 23%, appears in Upper Dial.

Regardless of how this type of problem is expressed, the "of" amount is always the divisor.

RECIPROCAL

When several items are to be divided by the same divisor, the reciprocal of the divisor may be used as a constant multiplicand. Multiplying this reciprocal by the item gives the same result as direct division.

The reciprocal of any number is found by dividing the unit "1" by that number.

To find the reciprocal of 20 divide 1 by 20. The reciprocal is .05. The reciprocal of 16 is 1 divided by 16, or .0625.

Example:

Find the reciprocal of 47.

To obtain an ample number of significant figures, shift carriage to the extreme right; place "1" in extreme left of Keyboard Dial and add.

Place 47 in extreme left of Keyboard Dial. Depress Automatic Division Key. The reciprocal is found to be .0212765957.

Example:

$$\begin{array}{r}
 432 \div 18166 = .023781 \\
 2564 \div 18166 = .141143 \\
 3347 \div 18166 = .184245 \\
 3485 \div 18166 = .191842 \\
 4765 \div 18166 = .262303 \\
 2581 \div 18166 = .142079 \\
 992 \div 18166 = .054607 \\
 \hline
 18166 \qquad 1.000000
 \end{array}$$

The reciprocal of 18166 is .0000550479.

Rule: A quick method of determining the decimal point in a reciprocal is to prefix to the significant figures of the reciprocal one less cipher than there are whole numbers in the divisor.

If the divisor is a decimal fraction, point off in the reciprocal as many whole number digits, plus one, as there are initial ciphers in the divisor; e.g., the reciprocal of .005765 is 173.4605.

PERCENTAGE RECIPROCAL

Dividing, by multiplying the reciprocal of the constant divisor by the respective dividends, produces a true quotient; i.e., the ratio that the divisor bears to the dividend. When it is desired to have this ratio appear as a percentage, as in "Percentage Pro-Rating or Distribution" (see Page 30), the quotient may be expressed as a per cent; thus, in the example above, first item, 432 is .023781 of 18166, or it is 2.3781% of 18166.

In commercial computing it is customary to care for this extra two place pointing off by locating the decimal point of the reciprocal so that multiplying it by the amounts gives direct reading in percentages instead of as ratios. The rule is:

If quotients are desired as percentages, place decimal in reciprocal two places to the right of its location as established by the regular reciprocal rule (see Rule at top of page).

Example:

The *Percentage Reciprocal* of 18166 (see example above) is .00550479.

For first item of example $.00550479 \times 432$ equals 2.3781%.

To obtain a clear idea of the meaning of "Percentage Reciprocal," ask the question, "What per cent of the total amount is '1'?" The answer to this is the Percentage Reciprocal, and any other value differing from "1" is obviously the per cent of the total amount which is obtained when the Percentage Reciprocal is multiplied by that value.

Ask nearest Marchant Agency for Marchant Method MM275 describing rapid short-cut method for this type of work.

PER CENT OF INCREASE OR DECREASE*Example:*

Compute the per cent of increase or decrease from Prior to Current Period:

July Current Period	June Prior Period	Difference	Per Cent of Prior Period
1489.76	1421.25	68.51	4.82%
1456.26	1512.37	—56.11	—3.71
2641.32	897.21	1744.11	194.39
784.72	2049.76	—1265.04	—61.72
3247.91	94.72	3153.19	3328.96

Decimals: Upper Dial 5 (an extra marker is placed at 3 to enable reading in percentages instead of ratios), Middle Dial 7, Keyboard Dial 2. Upper green Shift Key down on M models.

Calculating can be done by taking the items as they come, or by checking all items that show a gain and calculating them first, following for those showing loss.

For Increases:

With Carriage in 6th position, set up Current Period amount in Keyboard Dial and add. (It is helpful to remember that the black key is touched; i.e., “black” for black figures, a gain.)

Similarly set up Prior Period amount and reverse multiply by “1.” (It is helpful to remember that this operation has an opposite effect from the first.) Amount of Increase appears in Middle Dial if it be required. Depress Division Key.* Per cent of Increase appears at 3rd decimal in Upper Dial.

For Decreases:

As above, set up Current Period amount in Keyboard Dial and subtract. (It is helpful to remember that the red key is touched; i.e., “red” for red figures, a loss.)

Similarly set up Prior Period amount and multiply by “1.” Amount of Decrease appears in Middle Dial if it be required.

Depress Division Key.* Per cent of Decrease appears at 3rd decimal in Upper Dial.

If Amount of Increase or Decrease is not desired:

It is possible to divide without subtracting, thus having the Upper Dial produce a direct ratio which is read as a percentage. This procedure involves special interpretation depending upon whether or not there is a string of 9's at left of Upper Dial, etc. No time is saved by such procedure, as the mental interpretation of the result and the special manipulation to obtain it offset the time for the depression that produces the difference between the amounts.

*In cases of large increases or decreases such as in the third and fifth examples, line up left digits prior to division (see Page 32).

DECIMAL EQUIVALENT OF FRACTIONS

When a table of Decimal Equivalents of Fractions is not available, a fraction may be expressed as a decimal by dividing the numerator by the denominator.

Example:

Express as a decimal the fraction $5/64$.

Assuming the decimal is to be carried to 4 places, point off 5 places in the Upper Dial, 5 places in the Middle Dial, and none in the Keyboard Dial. Then divide 5 by 64. A glance at the right hand digit of the Upper Dial shows it to be a "2," which being less than "5" indicates that the quotient to four places is .0781. If the right hand digit of the Upper Dial had been "5" or more, the last digit of the desired four-place quotient would have been "rounded upward" to the next higher digit. If the Division-Clear-Return is not in use, it will be noted that the "remainder fraction" in the Middle Dial and Keyboard Dial ($32/64$) equals one-half, showing the full decimal equivalent to be .078125.

INTEREST

Interest may be computed on the *Silent Speed* Marchant in a number of different ways. A simple and universal formula easily used on the Marchant is:

$$\frac{\text{Principal} \times \text{Rate} \times \text{Days}}{360 \text{ (or 365)}}$$

Example:

Find the interest on \$3,549.00 at 5% for 41 days (360 day basis).

(Decimals: Upper Dial 3, Middle Dial 5, Keyboard Dial 2.)

Multiply 3,549.00 by .05 and the result by 41. Then automatically divide by 360. The interest, \$20.21, is correctly pointed off in Upper Dial.

Marchant Table 5 further simplifies this by showing 360 or 365 divided by "rate" as one factor, thus reducing the problem to multiplying Principal by Days and dividing by the Table Factor.

This and many other tables will be gladly furnished, upon request, by your Marchant representative.

SIMULTANEOUS MULTIPLICATION AND DIVISION

A product formed by the multiplication of two amounts which is to be divided by a third amount is best obtained on M models by multiplying the two amounts, permitting the product to remain in Middle Dial, and setting up the third amount as a divisor, producing the result in the Upper Dial without intermediate copying. Such a method is faster on these models than any of the usual means of performing a multiplication simultaneously with division.

On D models time may be saved by such simultaneous methods, of which there are numerous varieties. One useful plan is:

Grain Trade Application (using 10 column Marchant):

(This may be modified to account for "dockage" and also to show number of bushels)

34755 lb. (56 lbs. per bushel) corn at \$.93 per bushel. Find selling price.

Decimals: Upper Dial 6 and 3, Middle Dial 11 and 5, Keyboard Dial 8, 5 and 2.
Division-Clear lever inclined away from operator.

1. With carriage in 7th position, set up in Keyboard Dial 34755 with respect to 5th decimal and depress Subtract Bar.

2. Set up 56. at 8th Keyboard Dial decimal and .93 at 2nd decimal. Touch X Bar until 9's at left of Middle Dial have cleared. Next depress division key.

Selling price (577.18) appears in Middle Dial at right.

SPECIAL APPLICATIONS

Space does not permit reference to the many ways that the Marchant may be applied to the figure-work of business and industry. The Marchant Business Arithmetic (described on inside back cover) relates to operating technique and to the more common business computations. Special Marchant Methods, in pamphlet form, are also provided to show how to make calculations found in specialized fields. These are supplied to any Marchant owner or to any operator identifying himself with an owner. Ask for index from following list that applies to your work.

Retail: relating to the Retail Method of Accounting

Wholesale, Manufacturing, and Processing

Life, Fire, and Casualty Insurance

Public Utilities

Transportation and Warehousing

Petroleum, Mining and Metallurgy, Lumber

Engineering and Contracting, Surveying

Federal, State, County, and Municipalities

Banks: Analysis, Accruals, Serial Loans, Savings Interest, Exchange

Financial Mathematics: Amortizations, etc.

Statistics: Correlations, Deviations, Least Squares, etc.

General Accounting: Payrolls, Pro-ratio, Distribution, etc.

Basic Mathematics: Square, Cube, and Higher Roots; Direct and Inverse
Straight-Line and Curvilinear Interpolation, Differencing, etc.

COPYING ANSWERS . . .

CALCULATOR DESK ROUTINE

INTERNAL CHECK AND AUDIT SYSTEM

Whenever possible it will be advantageous to use the Double Entry Method of calculating. This gives data for future audit and also permits working from original data. In such procedure the Marchant becomes a part of the system of producing the reports or final data and not merely a side device that requires double checking before its results can be used.

DOUBLE ENTRY CHECK AND AUDIT PROCEDURE

Place media from which calculating data is obtained at left and Marchant at the right, and still further to its right (on separate stand if need be) the typewriter, biller, or device for preparing final report.

1. Note amounts on media and calculate same. Copy answer back to media.

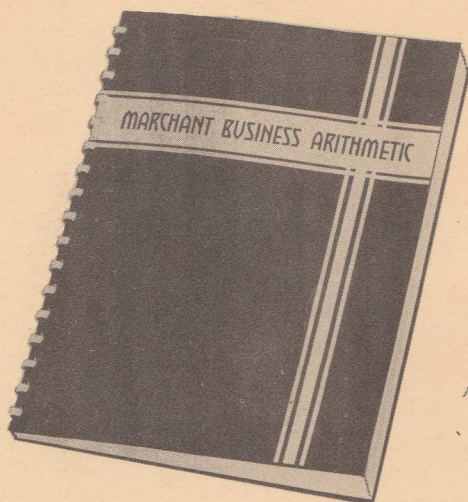
Read from Marchant's three dials all 3 factors and copy them *from the dials* to the Final Report (invoice, voucher, or whatever it may be).

3. Pick up media and bring it to extreme right and visually compare it with the Final Report as written. Clear Marchant dials and repeat.

It will be observed that this routine checks (a) *Errors of entering wrong figures in Marchant from media*, (b) *Errors in copying back the answers from Marchant to the media*, (c) *Errors in posting from Marchant dials to Final Report*. The media with answers copied thereon are available for future audit.

SIMPLICITY OF OPERATION

As the Marchant does not require specially trained operators, it may be used by those who ordinarily do many other things. This permits decentralizing the calculating, spreading it among the sections where figures originate, thus reducing liability of error and improving efficiency of figure production because the Marchant is self-checking. It is not necessary to do the work twice on a Marchant. The three dials give a check of each factor as entered and Double-Entry calculating as described above proves posting and transcribing.



THE MARCHANT BUSINESS ARITHMETIC

This 136-page, $8\frac{1}{2}'' \times 11''$ size, loose-leaf book is replete with information indispensable to the Marchant user who wishes to receive the full benefit of Marchant's possibilities in reducing the cost of figure-work. The first half of the book deals with operating techniques applicable to all work; the latter half describes the best methods of making the usual calculations found generally in offices of trade and industry. Hundreds of practice problems are shown, and a work-book is provided for recording the answers.

Price \$2.00 each, post-paid. The book may be inspected at any Marchant Agency or its Table of Contents and a sample page will be mailed upon request.

These **MARCHANT** Features

TELL THE STORY

Unprecedented Silent Speed
Continuously Flowing Dials
Smoothly Geared Mechanism
Positive Internal Dial-Stop
All-Electric Operation and Control

CARRIAGE

1. Instant Automatic Selective Tabulation
2. Step-by-Step Shuttle-Action
3. Automatic Two-Way Carriage Shift
4. Red Carriage-Position Indicator
5. Simple Pre-Set Decimals

CONTROLS

6. One-Hand Keyboard Control
7. Optional Two-Way Carriage Shift
8. Automatic Upper Dial Control
9. Positive Item Count
10. Automatic Repeat and Non-Repeat.

KEYBOARDS

11. Both Operated by Same Finger Method
12. Dial-Proof of All Entered Figures
13. Flexible Single-Key Depression
14. Easy-Action Key Touch
15. Overlapping Digits in Multiplier Keyboard

DIALS

16. Dials for All Three Factors
17. Automatic True-Figure Dials
18. Complete Capacity Carry-Over
19. Automatic Division Clearance
20. Positive Selective Electric Clearance

OPERATIONS

Automatic Simultaneous Multiplication
Automatic Complete-Clearance Division
Automatic Addition and Subtraction
Automatic Carriage Control and Return
Automatic True-Figure Check of all Factors

ALWAYS READY—NOTHING TO PREPARE

MARCHANT

ELECTRIC

SILENT SPEED

Calculators